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ABSTRACT

This report is based on the premise that giving teachers computer tools will enhance instructional effectiveness, encourage teacher collaboration, and maximize staff efficiency. The purpose of the report is to heighten awareness of the importance of providing teachers computer tools to work with and to describe the critical components needed to implement a computers for teachers program. The information presented was compiled for the Minnesota Department of Education using four approaches: (1) a literature review was performed to identify available teacher computer productivity programs; (2) school buildings were surveyed as to the microcomputer hardware, software, and inservice teacher education available to their teachers; (3) teachers were surveyed as to their access to computers and their level of interest in learning about word processing, grade book software, access to databases, instructional management tools, authoring systems, computer graphics, basic computer skills, desktop publishing, and online communications; and (4) schools that have implemented computer workstations for teachers were asked to report their experiences. The first of four chapters discusses the expectations for such a program and a list of expected outcomes. The second chapter addresses implementation strategies, including the critical components of computer and software access, inservice training, and on-site support. Criteria for selection of hardware, software, inservice training, and support are provided in the third chapter together with descriptions of exemplary school programs. Chapter 4 provides a summary of the survey findings followed by analyses of responses to individual questions on the Computer Usage Building Survey and the Computer Usage Teacher Survey; the questions are included. A 23-item bibliography concludes the report. (DB)

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COMPUTER TOOLS FOR TEACHERS: A REPORT

Minnesota Department of Education
Instructional Design Section
1989

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Table of Contents

Preface vii
Acknowledgements viii

Chapter One: Introduction

Expectations 2
Outcomes 4

Chapter Two: Implementation Strategies

Critical components 5
Computer and software access 5
  Access 6
  Computer work stations 7
Inservice training 8
  Incentives 10
Support 11

Chapter Three: Implementation Examples

Criteria for selection 16
Exemplary school programs 17

Chapter Four: Computer Survey Findings

Summary of Survey Findings 27
Computer Usage Teacher Survey 28
Computer Usage Building Survey 46

Bibliography 53

Preface

Increasingly, we expect to see computers on the desks of business- people, scientists, engineers, doctors, lawyers, social scientists, writers, even some artists and composers. In short, we have come to expect computers on the desks of everyone outside of school who's most intensely involved in the literate activity that school is supposed to teach and promote. Yet we have not stood up and shouted that computers should also be on the desks of teachers, to use as their own personal machines.

(David Grady "Giving Teachers Their Due,"
Phi Delta Kappan, September 1988)

Thanks to the vision provided by Governor Rudy Perpich and funding for a study provided by the 1988 Minnesota Legislature, a group of Minnesota educators have gathered together to stand up and shout for computer tools for Minnesota teachers. These Minnesota educators believe that giving teachers computer tools will enhance instructional effectiveness, encourage teacher collaboration and maximize staff efficiency.

As we restructure education and move toward school-based management, giving teachers the tools to work with becomes very important. Just as business provides the technology tools to make its workers more productive, the time has come to provide similar tools to the workers in another of Minnesota's largest businesses. Minnesota education's most valuable resource is its teachers. Minnesota has made a large investment in computing for kids of which it can be very proud. Now it needs to help teachers.

Acknowledgements

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Chapter One: Introduction

The concept of computer tools for teachers is relatively unexplored in literature and in practice. The Minnesota Department of Education convened a task force on computer tools for teachers that developed this report.

Information for this report was gathered using four approaches. First, a literature review was performed to serve as an information resource for the MDE task force, to determine what teacher computer productivity programs exist and critical factors for introducing teachers to the use of computers as a professional productivity tool. Second, each school building was surveyed as to the hardware, software and inservice available to its teachers for teacher computer work stations and productivity tools. Teachers were also surveyed as to their access to hardware, software, level of proficiency using computer applications, level of interest in learning about computer applications and inservice time preferences. And last, schools that have implemented computer work stations for teachers were asked to complete an in depth report if they were willing to share what they had done.

The background information plus the expertise and experience of task force members serve as the basis for this report. The computer tools for teachers task force believes that giving teachers greater access to computers and software for their own professional use will make a difference in teachers' instructional effectiveness and productivity. The purpose of this report is to heighten awareness of the importance of providing teachers the computer tools to work with and to describe the critical components needed to implement a computers for teachers program.

This report describes the following elements:

The importance of teachers having convenient access to computers.

The critical components for implementing a computers for teachers program.

Examples of how some schools in Minnesota and other states have implemented computers for teachers programs.

The current status of teacher access to computers, software and training.

Teachers' level of computer proficiency and interest in computer inservice.

Expectations

Education's literature focuses primarily on the use of the microcomputer as a means for instructional delivery, compared to business and industry literature, which is filled with analysis and subsequent praise of the microcomputer as a tool for improving overall staff productivity and effective management decision making.

It is understandable that educational environments would place an emphasis on computer applications that relate directly to information and instruction needs of students. Still, many computer education experts believe it is a practice that puts the cart before the horse. Some representative statements follow:

Teachers are the key to any effective implementation of technological media. Their opposition guarantees failure of even the best systems. Even if adoption of particular technological systems or projects must be postponed, educating teachers in the philosophy and implementation of technology is prerequisite to any successful implementation. No proposed project should be adopted and moved into the state of implementation until the teachers whom it will affect have been educated to the point where they can contribute largely to the plan and implementation of the project. (Simmons, 1975)

Decisions regarding the appropriate place of computer technology must be made by individual teachers, because they are the only ones in a position to determine how that technology can fit into the daily routine of classroom life. Of course, such decisions cannot be made by teachers who have no experience with the technology, and so the natural corollary to my guiding principle is that ... the starting place for successfully introducing computers into the instructional process is not as an educational tool for children, but as an administrative aid for teachers. (Wagschal, 1986)

Another author suggests that teachers need to learn to use the computer as a general purpose tool. When teachers use the computer as a tool for such mathematical applications as figuring grades, they are acting as role models for their students, demonstrating that computers are tools for basic mathematics. (J. Cook, in Robyler, 1986)

Only when teachers have learned to use the computer as a tool to enhance their own thinking can they encourage a similar ability in their students. One of the strongest proponents of this theoretical position is Turkle (1984) who, in her acclaimed book, The Second Self: Computers and the Human Spirit, suggests that the computer is an expressive medium, requiring a doing/using experience in order to have any kind of sense of what can be done with it. In a recent interview she stated, "You can't teach

poetry writing if you've never written a poem." Computer teaching, she believes, is characteristic of the same learning and teaching process, one that involves an expressive medium, an expressive experience and an expressive environment. Ideally, everybody (students and teachers) should get to use the computer as a productivity tool and get to feel comfortable with it. Additionally, Turkle suggested that the educational system is the "only institution that provides tools for its clients rather than its workers." (Rhodes, 1986)

An independent consulting firm (Tor Dahl and Associates, 1987) performed a task analysis of teacher job duties within Independent School District 112 (Chaska, Minnesota). Study findings indicate a fifty-two (52) percent potential for productivity improvement. Of seventeen (17) non-teaching tasks, over half of the teacher-participants believe twelve (12) of them were obstacles to productivity and ten (10) of these twelve were significant obstacles to productivity, including those tasks related to figuring grades, typing and general recordkeeping. Conclusions of the study suggest that productivity improvement among the teachers in the Chaska district could drastically free teacher resources, improve performance, reduce stress and increase job satisfaction. Teachers also indicate a desire to establish individually developed improvement plans, including the use of computers.

Teachers face myriad change forces today. They are asked to actively participate in the restructuring of schools by developing and delivering an outcome-based curriculum, improving instructional effectiveness, and implementing school-based management. Providing appropriate computer tools for teachers will assist them in managing these forces in an effective and efficient manner.

Meeting the needs of teachers for productive use of technology is like building a four-legged stool with legs of enabling software, appropriate hardware, regular training, and peer support. Shaving the emphasis off one of these legs unbalances the stool and lessens the probability of teachers effectively using the computer as a productivity tool. Removing one of these legs will send the system crashing to the floor. This stool is one essential component needed around the table for restructuring schools and instruction.

Teachers properly trained, supported and with access to computer work stations and productivity tools, can maximize their effectiveness. It is important that they be expected to demonstrate productive behavior in the areas of instructional effectiveness, teacher collaboration and staff efficiency.

Outcomes

Given the necessary equipment, appropriate software, adequate training and ongoing support from their peers, teachers could be expected to demonstrate the following outcomes.

Teachers will use word processing to create, customize and revise high quality instructional materials. Transferring the text to a desktop publishing tool allows teachers to create an appealing format and add illustrations. They will develop effective instructional materials that go beyond the textbook to meet individual learner needs for remediation and enrichment. An added benefit is that materials developed using these tools can be shared with colleagues via networks or computer disks.

Teachers will create tests by selecting items from a test item bank . Each time the test is given, it can be easily updated to include new material taught and expand items for areas emphasized.

Teachers will access detailed student performance records from a database, enabling them to make more effective decisions about instruction. Based on the data, they can regroup the students and design individualized lessons for students needing reteaching or enrichment activities. Records of progress on meeting learner outcomes in electronic gradebooks will allow for frequent feedback to students and reporting to parents.

Teachers will use online communication to collaborate on the preparation of instructional materials and jointly plan curriculum with local staff and outside experts. They will share the maintenance and use of student information on a networked database of individualized educational plans for students.

Teachers will create a wide variety of instructional aids including transparencies, slide shows, poster/banners, bulletin boards, calendars of assignments and flashcards. Student seating arrangements can be quickly changed using a seating chart program.

Lack of time is a pervasive teacher concern. After an initial learning period, teachers will realize a reduction in the time needed for the use of productivity tools. Teachers will demonstrate this efficiency in rapidly accessing student information, customizing instructional materials, and providing student information to the home and office. In addition, active involvement in peer coaching while using computer tools will enhance the process of teacher collaboration.

The role of teachers is in transition. Computer tools offer unlimited potential for meeting increasing instructional demands. The vision is shared. The tools are needed to help make it a reality.

Chapter Two: Implementation Strategies

Critical Components

The computer tools for teachers task force identified four critical components for enabling teacher use of computer productivity tools.

- Computer access
- Software access
- Inservice training
- On-site support

All four components are essential for successful teacher use of computers. This assumption is based on their own extensive experience facilitating teacher use of computers in their districts and is supported by similar projects in Minnesota and New Hampshire public schools and Lake Washington School District in the state of Washington. These projects are described further in chapter three of this document.

In September 1988, the Minnesota Department of Education conducted surveys of Minnesota teachers and school buildings to determine the availability of computers and productivity software for teachers and to assess teachers' computer proficiency. The teacher comments on the survey confirm the importance of the four components. The quotes used in this chapter are in response to a final open-ended question on the teacher computer usage survey, "What is needed to increase your interest in using computer productivity tools?"

Computer and Software Access

Turkle (in Rhodes, 1986) suggests issuing a computer to every teacher, permitting them to take them home with a "no restrictions" on use policy. She further believes the school should have in-school units, immediately accessible to teachers at the time they are preparing instructional materials, writing notes to parents and performing other daily tasks. Wagschal (1986) also supports the placement of computers with each individual teacher with a clear understanding that they may use the machines for any purpose they deem appropriate. Both Turkle and Wagschal suggest that teacher computer training begin with ready access to inexpensive, basic systems equipped with standard business software,

including a word processor, a spreadsheet, a data base and a printer that provides printouts suitable for legible photocopying.

The survey indicates that only 47.41% of teachers responded that they have teacher computer work stations in their building. Most often these machines are the Apple II type which often do not have adequate capacity to perform the tasks needed by teachers.

The comments that follow are typical of teachers responding to this survey. They demonstrate both the opportunity and the challenge for introducing computer productivity tools into Minnesota schools.

Access

Each teacher should have a computer for her/his room to use as she/he feels it is needed.

I would like to have a 'good' computer more accessible to my classroom. We have little time during the day to leave our room to use the computers. I feel a printer is very useful.

A computer available for writing tests, storing info and data, and grade managing. I NEED ONE in my room! It angers me to think I'm supposed to be able to compose a test etc. at an empty station in a lab while another class is taught!

I need time to become familiar with now unfamiliar tools using the computer. I need an exclusive use of a computer next to my desk. This may sound demanding but it is true. Availability and convenience in computer use are issues.

Borrowing a school computer to use at home this summer was the key factor in my learning several computer applications.

The message is clear. If computers are to be used effectively by teachers as productivity tools, they must be readily and exclusively available for their use. Locked doors, priority given to student use, inaccessible laboratories, and checkout policies that restrict teacher access discourage teachers and frustrate attempts to learn more about computing tools.

Computer Work Stations

A computer work station consists of hardware and software. For such a station to be useful for a teacher, it must make the work of planning, preparing, and presenting instruction more productive and stimulating. It should do this by reducing the time teachers spend on clerical duties, while at the same time producing high quality, easily individualized materials.

The software applications needed for the clerical work of teaching include:

- word processor for writing materials and communications home
- database for organizing student information
- spreadsheet for financial management and charts
- test generator for custom designing and individualizing tests
- form generator for seating charts, book lists, and mailing labels
- outliner for lesson design and lecture notes
- presentation package for producing overheads and slide shows
- graphics package for adding illustrations to materials
- communications package for consulting with educators via modem
- grade book package for analyzing and reporting progress
- desktop publisher for producing quality work sheets and readings

The basic computer work station should be conveniently located in the teacher's work area, office or classroom. If they are going to be used, the teacher must be able to count on them being available during preparation time and before and after school. Therefore, there must be enough of them for staff to conveniently share, and they should not be pulled for administrative work. Ideally, each teacher should have a computer.

The hardware used with this software must quickly handle the large volumes of data, tests, letters and forms the typical teacher manages. A minimum of sixteen bit processor which increases the speed of operations and two disk drives is required for a basic teacher work station to run the types of software listed. In addition, extensive memory of no less than one megabyte, preferably more, will be necessary for the volume of information, either in the individual machine, on a hard disk drive or shared via a network.

The basic computer work station will also need a printer with graphics capability for quick copy and rough drafts. Several computers may be connected to a single printer. The building will want to share a laser printer for printing high-quality, reproducible, final copy, as well. A modem and communications software will be necessary for accessing online information, but is not needed on each machine. One can either be shared through a network or a few can be provided on specific machines.

A network of computers wired together would also encourage more collaboration among teaching staff through the capability for sharing files. A network with a server also makes the sharing of equipment easier since a teacher can access their files from any work station. Other hardware options include digitizers for picture input, text and graphic scanners for written and graphic input, CD-ROM storage devices like the Minnesota Test Item Bank and test scanners.

It is not enough just to have these computer stations and software packages available somewhere in the school. Teachers need convenient access to hardware and software in their offices or classrooms because their time and mobility is limited during the school day. The area where the computers are located should be inviting and comfortable for teacher use.

The software must be stimulating to use, not only removing the drudgery but enticing the teacher with the feeling of being freed to create meaningful lessons and materials along with being empowered to manage their learning environment. Sufficient copies of this comprehensive software must be readily available at the easy to use work stations or on a network.

Inservice Training

Wedman and Heller (1984) concluded that teacher adoption of computer technology would be enhanced given enough time, enough equipment and sensitive training. Cicchelli et. al (1984) found that release time, use of consultants, availability of equipment and software, intensive "hands-on" training experiences and peer interaction opportunities were significant factors toward successful computer technology adoption through inservice efforts. Cavender (1986) also found that intensive hands-on training, peer interaction and follow-up support structures

helped ensure that teacher inservice attitudes and skills transferred to specific work environments after formal training was provided.

Teacher-users of all kinds of technology continually expressed the same needs, that is, the need for sufficient hardware and software during and after inservice, the need for additional time to work with the technology both during and after inservice, the need for experiences which provide substantial peer interaction and, importantly, the need for inservice training personnel who understand the conditions under which the technology will be applied.

In the Department computer usage building survey, 77.65% of the schools report that their districts provide teacher computer training and 66.46% of the schools report that their districts pay registration and/or expenses for teachers to receive training in using productivity software. Some typical teacher comments regarding computer inservice include:

I think it is a travesty that educators tend to be so unfamiliar with computers. I think we should all be given easy access to computer instruction and have a computer in each classroom. As it is now (in my school at least) it requires a great deal of effort by teachers to learn about computing and their classroom applications.

I just need more training in use of software and various programs.

I need to gain further knowledge and experience in using computers. I'm sure that I will use computers more and more in the future as I gain knowledge about their use and become better informed about the availability of educational programs.

More inservice at a time I could participate.

Availability of workshops on computer use within a 30 mile radius of home or school.

There are no classes in this area for us to take. We need to have classes offered at a time when we can take them. Plus we have to be notified of them. It is hard to take classes if you don't know what they are.

Will the training lead to positive results in the classroom?

Inservice opportunities need to be conveniently scheduled. The times most frequently mentioned by teachers are during teacher workshop days and during the summer.

They also want the workshops to focus on their specific needs and abilities. The comments of two teachers exemplify the widely varying inservice needs. As the first, more experienced teacher puts it, *"I use the computer a lot--for grades, word processing, and some data base. I would be interested in inservice, if the group would be divided according to ability and knowledge of the computer. I'm not interested in anymore beginning computer classes."* The second teacher says, *"I have taken several courses to no avail because the instructor could not communicate to the beginner level."*

Follow through training after the initial inservice is also very important. *"Also I would like to see an additional day of training offered a month or two after the initial training. After working with the programs for a time I would surely have lots of problems and questions which, if answered then, would prevent me from throwing the whole thing over in frustration."*

Incentives

Implementation of computer tools for teacher productivity depends on providing incentives for training and working with selected groups rather than attempting to work with everyone at once. Key people to start with are those who demonstrate an interest and a readiness to learn. Focusing on a small group to begin with has these advantages:

1. Key individuals, modeling computer productivity tools, can demonstrate positive and worthwhile applications for all teachers to see.
2. A pool of individuals is created who can serve as a resource for training others.
3. With additional incentives, these same staff members can provide follow-up support for newly trained staff.
4. Training opportunities can be focused on a small number of individuals ensuring adequate training and follow up.

Morehouse et al. and Carlson and Berger highlight the use of peer experts and peer coaching, both during and after inservice, as extremely helpful to gaining teacher acceptance and use of the technology being introduced. Developing a team of key support personnel who are comfortable with the computer and specific applications establishes role models for other teachers. Identification of key support personnel, both at the building and district level, who have well-defined roles for training and facilities management, enhances teacher acceptance and post-inservice transfer of attitudes and skills to the participants' specific work environments.

One incentive to consider is awarding key individuals or groups (i.e., grade level or department) their own computer work station. As other teachers and groups are trained, they too could receive a computer work station. Awarding new software, providing release time to develop useful applications, and giving recognition for sharing these applications can provide ongoing incentives for using computer productivity tools.

The key question that must be answered for teachers before they are willing to commit their time and energies to learning to use computers is how they will make their teaching more effective and make more efficient use of their preparation time. As one teacher responding to the computer survey puts it, *"How can a computer be used to improve instruction and class management in my subject area?"*

Support

Inservice training alone is not enough. Support following training on these tools is critical if we expect teachers to use them. Experimenting with these tools without someone to help and provide encouragement can be frustrating. According to the Department computer survey, 91.24% of Minnesota schools have identified a staff member within the building to assist teachers who have software application questions and problems.

Teachers request:

Some person assigned in our school to assist when I encounter problems using the hard or soft ware.

We need someone in our building who will consistently help the novice computer user so he/she becomes familiar. It has to be more than a two hour inservice workshop, given a disk, and said 'go to it'.

Availability of technical resource person to help with inservice of computer and software -- answering of questions.

Knowing that there will be support (technical) available when systems don't go right.

I need actual hands on practice with a trained person available for the times I make dumb mistakes and I spend hours trying to figure out what I did, and what I should do.

The introduction of computer productivity tools means change and developing new skills. Desirable change must be supported if it is expected to happen. Who can these support people be? Building or district-level coordinators are essential to long-range planning and implementation. But the most powerful model for supporting day-to-day operation is teachers serving as a resource for other teachers. Teachers like to learn from other teachers and they want to have access to follow-up support when questions or problems arise (Morehouse, Hoaglund and Schmidt, 1987), a finding also common among the many studies cited within the literature. Stecher and Solorzano (1987) offer this guideline: The chance that a teacher will seek out help is inversely proportional to the distance the teacher must go to get help. Stipends, recognition, lane change credit, compensation time, professional development allowances etc., can provide the incentives for sharing what is known with colleagues.

A computers for teachers program also needs the support of district and building administrators. Administrators, as instructional leaders in their schools, can provide the personal and institutional support needed to reinforce teachers' use of computer productivity tools.

National studies, involving investigation of teachers' potential interest and concerns about the use of computer technology within a broad spectrum of school environments additionally highlight the importance of strong administrative support, adequate access to hardware/software and staff incentives which encourage professional development (Molinar, 1981; National Education Association [NEA], 1983). The NEA findings, specifically, found eleven school practices that fostered teacher use of the computer, including use of training stipends, summer workshops, release time for inservice training and teacher recognition programs.

As reported by Sturdivant (1986), the Houston Independent School District provided 20 hours of inservice training to all administrators and 40 hours of inservice training to school board members to assure that they had an understanding of the computer's potential, implementation obstacles and necessary administrative policies and procedures. Other successful programs have offered similar administrative training and suggest that it promotes positive administrative practices which result in improved support for hardware/software considerations, enhanced working environments and development of staff incentives (Jay, 1981; Faerstein, 1986; Holland and Rude-Parkins, 1986; Morehouse, Hoaglund and Schmidt, 1987; Cicchelli et. al, 1984; Stecher and Solorzano, 1987). Descriptive listings of successful incentives, including use of mentors, newsletters, stipends and annual technology fairs to encourage teacher use and provide individual/group recognition are offered in Trainor and Fregosi (1986) and Sturdivant (1986).

Minnesota teachers agree:

The State Dept. must educate school administrators to the value of the computer as a tool and the resources needed to make it happen (time, money, software, hardware, motivations, etc.)

Encouragement by the administration....

Administration & school board agreeing to do it.

Chapter Three: Implementation Examples

The schools in this chapter are good examples of how a computer tools for teachers program could be implemented. Other exemplary programs may exist which are not identified in this report. None of the schools described in this chapter believe they have fully implemented a computer tools for teachers program. These programs are really in the early stages of development.

Because each school's physical plant is different and the staff organization varies from school to school within a school district, the task force recommends the building level as the appropriate level to implement a computer tools for teachers program. Each school's teachers and administrators should develop a plan that will work best for their individual school.

In addition to the six Minnesota examples, two other computers for teachers programs were identified that present unique models. The first is from Lake Washington School District, Washington. This school district established a computers for teacher program in which teachers receive their own Apple IIGS computer for home use by attending nine days of computer training. The teacher may also receive a computer printer by attending an additional two-and-a-half days of training. Ninety four percent of the district's teachers have participated in the program. Software includes problem solving, word processing, database and spreadsheet programs. A core group of 36 teachers, who volunteered for an initial training session conducted by the schools' master teachers and Apple Computer provide the computer inservice training for their colleagues. Because district teachers from each school are used to provide the inservice training, they are available in the schools on an ongoing basis to help.

The second model comes from New Hampshire where former Governor John Sununu funded computers for teachers in his Governor's Initiatives for Excellence in Education. Local school districts could apply for special grants to purchase computers for teachers. Application criteria included buying computers, software and printers for teachers, including a computer training component for teachers, and encouraged some local monies and in-kind services.

One Minnesota school district, Princeton Public Schools, has established a goal of using capital outlay funds to provide each teacher with a computer and printer by the end of the 1991-1992 school year. The teachers will be able to use the computer both in their classrooms and at home for instruction and management activities.

Criteria for Selection

The Minnesota exemplary programs are described using the critical components introduced in chapter two. The following attributes were used as criteria for selecting these exemplary programs for inclusion in this report:

Hardware

is easily accessible.
is powerful enough for the tasks.
has sufficient memory for the tasks.
is available to take home.
includes easily accessible dot matrix and laser printers.

Software

is easily accessible.
offers a variety of programs appropriate for applications.
is powerful enough for the tasks.
stimulates teachers' interest in using the application.

Inservice training

meets individual needs.
provides follow-up sessions or peer coaching.
provides incentives.

Support

is provided by building person who helps with software.
is provided by technical person who keeps machines and software running.
is provided by building administrator who provides resources andencouragement.

Teacher Computer Work Stations

DISTRICT:	Anoka Hennepin Schools District 11
SCHOOL:	Oxbow Creek Elementary 6050 - 109th Ave. So. Champlin, MN 55316
CONTACT PERSON:	Diane Hewitt 612-493-4171

Hardware:

A computer lab is serviced by a MAC II 80 megabyte file server which provides for 30 student computers, one teacher computer and four student computers in an adjacent minilab. All the computers in the labs are Apple IIGS machines.

A teacher work station is set up in the media office, consisting of a Macintosh SE and an Apple IIGS, connected to a LaserWriter Plus. In addition, each teacher has an Apple IIGS connected to an ImageWriter II printer in his or her classroom.

Teachers are free to take home the computer from their own classroom, as well as the Macintosh SE.

Software:

A wide variety of software is used in the lab, classroom and at the workstation. Most commonly used for the Macintosh SE would be Microsoft Works, Ready-Set-Go, Hypercard, Labelmaker, and Microsoft Word. Teachers utilize AppleWorks, Grade Manager, CSL Marks, Dazzle Draw, VCR Companion, Publish It, Print Shop GS, Award Maker Plus, Certificate Maker, Paintworks Plus, Calendar Crafter, as well as many others, for the Apple IIGS machines.

Inservice Training:

Inservice training adopts a variety of formats.

1. Large group instruction on a workshop day, without students present, or on a release-time basis for half a day.
2. Small group instruction before and after school, or during preparation periods, or during a release time provided by substitute teachers or student teachers.
3. Individual instruction whenever, and as needed.
4. Virtually all is "hands on," although sometimes, due to time considerations, a verbal synopsis only will be given. The purpose of this is to acquaint staff with new functions in an existing program, or with new programs that are available. Usually this is followed up with a "hands on" in-service for more in depth learning.

Support:

A technology coordinator is available for two hours a day in the building. Three district-wide technology coordinators are available on a need basis.

Teacher Computer Work Stations

DISTRICT:	Chaska Public Schools District 112
SCHOOL:	Chaska High School 1700 Chestnut Street Chaska, MN 55318
CONTACT PERSON:	Dan Pelowski 612-448-8620 extension 674

Hardware:

An Appleshare Network with a Macintosh II 80 megabyte server provides an IBM System 2 Model 30, 5 Macintosh SE 20's, and Apple IIGS and IIe, a Macintosh II 4/40 desktop publishing station with Apple Scanner and Radius two-page display, two ImageWriter II printers, and a Laser Writer Plus. The hardware is located in a teacher center office area just off the school's four computer labs and in the back of two of the labs. Two of the Macintosh SE 40's are on carts for teachers to check out to use in their rooms or office areas. The ratio of teachers to work stations is 10/1.

Teachers may take home computers after school and return them before the next school day.

Software:

Software used includes MacWrite, Microsoft Works, Print Shop, Cricket Draw, Mac Paint, Super Paint, Calendar Maker, Crossword Magic, Laser FX, PageMaker, Silicon Press, Phone Book, Cricket Graph, Passport, Hypercard, Total Point, Gradebook, Grade Manager, AppleWorks, Certificate Maker and Multimate.

Inservice Training:

Most inservice training is in the form of hands-on, one-to-one instruction. Teachers wanting to learn how to use a piece of software or hardware ask for assistance from the technology coordinator or the lab aide. They are provided with over-the-shoulder direction as they work through the program until they are comfortable enough to solo. Then they use the lab aide and coordinator as a help resource when they have difficulty. All teachers were given a one-day workshop in computer use and teacher utility software four years ago. New teachers have the option of taking one school day (sub provided) to learn about the operation of the computer or review software. Work sessions are provided when several staff have the same request for help, and for new applications. The sessions are usually after school for about 45 minutes. Continuing education credits are offered.

Support:

The lab aide is available full time and the technology coordinator is available one-half time.

Teacher Computer Work Stations

DISTRICT:	Detroit Lakes Public Schools District 22
SCHOOL:	Detroit Lakes High School Roosevelt and James Detroit Lakes, MN
CONTACT PERSON:	Robert Soukup 218-847-4491
	Linda Vaughn 218-847-2493

Hardware and Software:

Location	No. of Teachers	Hardware	Software
English	6	6 IIGS/1 printer	AppleWorks Multiscribe MECC software
Social Studies	6	3 IIGS/1 printer 1 IIe	AppleWorks Multiscribe MECC software
Agriculture	1	1 IIGS/1 printer	AppleWorks Multiscribe Ag software
Art	1	1 IIGS/1 printer	AppleWorks Multiscribe Paintworks
Math	4	1 IIGS/1 printer	AppleWorks Multiscribe Math programs
Physics	2	1 IIGS/1 printer	AppleWorks Multiscribe MECC software
Phy Ed	4	1 IIGS/1 printer	AppleWorks Multiscribe MECC software

Special Ed	2	1 IIe/1 printer	Health programs AppleWorks Multiscribe
Music	2	1 IIGS	MECC Software AppleWorks Music software

The school has a computer check-out form that teachers must fill out. They indicate what they plan to do with the equipment and software and agree to financially reimburse the district if the equipment is lost, stolen or needs repair.

Inservice Training:

Inservice is offered at a variety of times by our technology coordinator. The inservice training has not always been successful. Staff must have hardware and the software available, or it just isn't going to stay with them.

Support:

Teachers know where and how to contact the technology coordinator and they make use of this opportunity at school and at home.

Teacher Computer Work Stations

DISTRICT:	Minnetonka Public Schools District 276
SCHOOL:	Minnetonka Intermediate 6421 Hazeltine Blvd. Excelsior, MN 55331
CONTACT PERSON:	Paul Johnson 612-474-0907

Hardware:

There are three Macintosh Plus systems with 20 megabyte hard disks drives, and one of the systems has a MacGenius full-page display attached. All three systems are attached to a Laser Writer Plus with Apple Talk. An Apple IIGS computer is available for teacher use and is able to be attached to Laser Writer. An Apple IIe system with an HEI card reader and an ImageWriter II is used for IMS test scoring. This hardware is in a teacher publishing lab located between our two computer labs for student use.

Software:

AppleWorks, Bank Street Writer III, Microsoft Works, Print Shop, SuperPrint, Mac Paint, Super Paint, PageMaker, Hypercard, Certificate Maker, Top Honors, Thunder Scan, and a large variety of clip art collections.

Inservice Training:

As staff members have a project they would like tackled, they are given one-to-one instruction on using the Macintosh. This instruction could be given by the elementary computer coordinator or a paraprofessional that works in the computer labs.

Support:

There are two paraprofessionals that work in this area six hours each day and the elementary computer coordinator is available one-half time.

Teacher Computer Work Stations

DISTRICT: Saint Francis Public Schools
District 15

SCHOOL: Saint Francis Middle School
23026 Ambassador Boulevard
Saint Francis, MN 55070

CONTACT PERSON: C. W. Johnson
612-753-2550

Hardware:

Twelve Macintosh work stations are available. Computers are located throughout the building (lounge, xerox room, machines on each level. These stations share an 80 megabyte hard drive, a LaserWriter II printer and an ImageWriter II printer. The ratio of teachers to work stations is 5/1. Teachers may take computers home by signing them out in the media center.

Software:

Word processing, database, spreadsheet, communications, grading, graphics desktop publishing, and calendar programs are available. Laser printing and telecommunication capabilities are available to all stations. Passwords have been assigned to portions of the hard disk. Teachers are encouraged to save all data on their own data disks. Site licenses are being procured for as much software as possible.

Inservice Training:

The middle school provides inservice training on application packages on a volunteer basis. Lane change credits are available for computer classes.

Support:

A computer committee and a building computer coordinator (available one hour per day) are available. The media center personnel also are available to help.

Teacher Computer Work Stations

DISTRICT:	Stillwater Public Schools District 834
SCHOOL:	Stillwater Junior High 110 East Pine Street Stillwater, MN 55082
CONTACT PERSON:	Bruce H. Deger 612-439-5160 extension 202

Hardware:

Teacher work stations are Macintosh SE's with hard drives. Each is networked to a Laserwriter Plus and to three ImageWriters. There are three Macintoshes in a teacher work area and another for staff in the library. Three other Macintosh SE 20's are assigned to support personnel and are available to staff on occasion. There is also one Apple IIGS and ImageWriter II on a movable cart which teachers can check out or use in the teacher work area. This is primarily for staff who have not yet made the decision to use the Mac or who have some specialized software not yet available in a Mac version. To take home equipment, teachers fill out a short checkout form after checking with the computer services coordinator.

Software:

Software includes Microsoft Word, Microsoft Works, Microsoft File, CSL Marks (a grade manager), Deluxe Music Construction Set, Print Shop, Fullpaint, Superpaint, and Ready Set Go!

Inservice Training:

Workshops are provided on a no cost basis throughout the year. Some of these are conducted by TIES staff and others are offered by the building computer services coordinator. District salary credit is provided for teachers who participate in workshops.

Support:

An instructor in the building is assigned a .8 teaching load and is designated to be the computer services coordinator for the remaining .2 of his contract. He offers individualized training, support for both teachers and support personnel and distributes current literature, news, etc., to all staff.

Chapter Four: Summary of Survey Findings

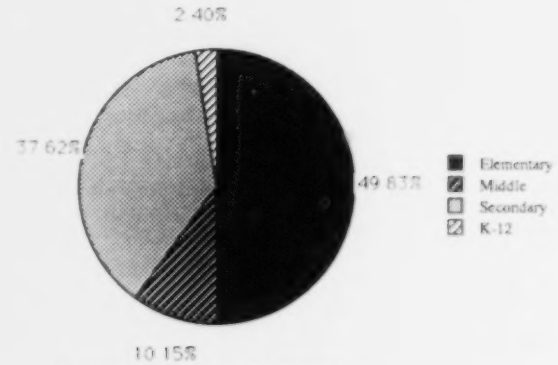
- The majority of teachers do not have computer work stations in their buildings which are for teacher use only.
- Middle school and secondary school teachers have the greatest access to teacher-only work stations.
- Elementary school teachers have less access to teacher-only computer work stations than teachers at all other grade levels.
- Since 79 percent of the elementary school classroom teachers are female, female teachers have significantly less access to teacher-only computer work stations.
- Fifty-three percent of teachers report that computers for teacher use only are not available in their schools, while 38 percent of schools report having no computers for teacher use only. Teachers evidently view some computers as inaccessible that the schools view as accessible by only teachers.
- Access to productivity software does not appear to be a major issue. Perhaps if more equipment were available it could become an issue, since availability is most often limited to checkout from a central location.
- Most teacher computers are the Apple II type which often may not have adequate power and memory to run the more powerful software applications.
- Elementary and female teachers rate their computer proficiency lower on all skills except for graphics and mastery management systems.
- Teachers with more than 26 years experience rate their computer skills and interest lower than other teachers.
- Other than basic computer skills, word processing and graphics, from 33 percent to 85 percent of teachers when rating their level of proficiency responded "unfamiliar; do not know what this item is." Awareness level inservice is needed.
- Except for online communications and authoring systems, teacher interest in learning more about computer applications is high.
- Other than basic computer skills and word processing, the majority of teachers rate their computer proficiency for specific applications as low.
- Teachers with five years or less teaching experience rate their interest in learning all skills higher than other teachers.
- Ninety-one percent of schools have identified a staff member in the building to help teachers with computer software problems.

Computer Usage Teacher Survey Results

Statement of Sampling and Methodology

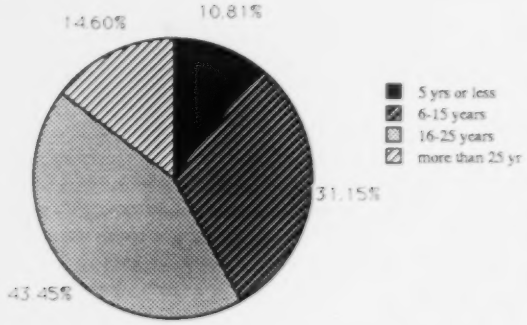
In September of 1988, computer usage teacher surveys were sent to a twenty percent sample of Minnesota teachers or 7371. The initial sample included teachers from all Minnesota public school districts. Forty-six percent or 3432 0f the surveys were returned. The purpose of this survey was to determine teachers' access to computers and software, to assess teachers' computer competencies and to determine teachers' interest in computer inservice.

Distribution of Responding Teachers by Grade Level



Responding Teachers by Grade Level

Distribution of Responding Teachers by Years Experience

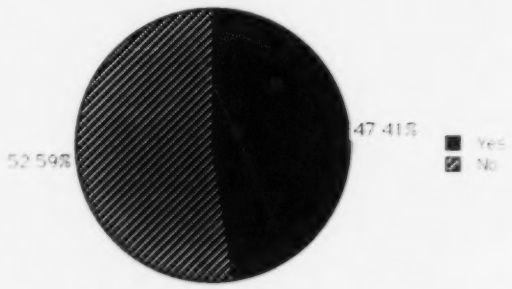


Responding Teachers by Years Experience

Summary of Survey Responses

Teacher Computer Work Stations

1. Are there computer work stations in your building which are for teacher use only?



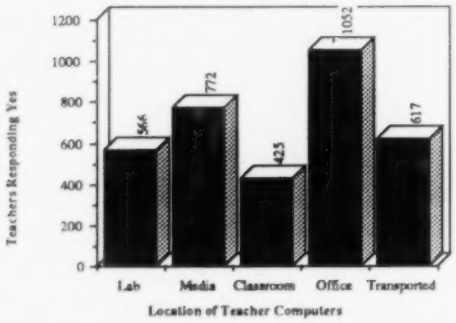
Teacher Computer Work Stations in Building

The majority of teachers do not have computer work stations in their buildings which are for teacher use only. When this data is analyzed by respondent's gender or grade levels currently teaching, a slightly different picture emerges. Elementary school teachers have less access than teachers at all other grade levels. Considering approximately 79 percent of the elementary classroom teachers are female and 65 percent of the secondary teachers are male, the statistics more likely reflect what grade level a teacher teaches than by their gender.

Yes	Females	40.12%
Yes	Males	57.14%
Yes	Elementary	35.48%
Yes	Middle	62.29%
Yes	Secondary	60.46%
Yes	K-12	47.3%

Location of Teacher Computers

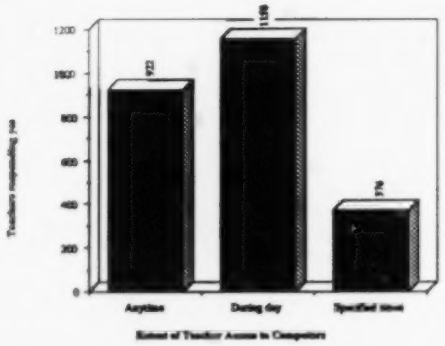
2. Indicate where computers for teacher use only are located in your building.



Teachers could answer yes to one or more of the listed locations. The least frequent location for teacher computers is in the teacher's classroom. The most frequent location for teacher computers is in a teacher workroom or office.

Extent of Teacher Computer Access

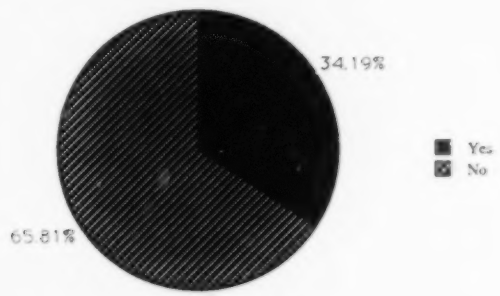
3. Indicate the extent of access you have to these computer work stations.
   a. I can use a microcomputer any time (days or evenings).
   b. I can use a microcomputer any time during the school day.
   c. I can use a microcomputer only on specified days and/or only during specified hours of the day.



Teachers could answer yes to more than one of the listed times. Only those teachers answering yes to whether or not there are computer work stations in their building were asked to answer this question. Secondary school and K-12 teachers are more likely to answer yes to statements a and b than other teachers.

Taken Microcomputer Home

4. Have you taken a school's microcomputer home for assisting you with teaching associated work?

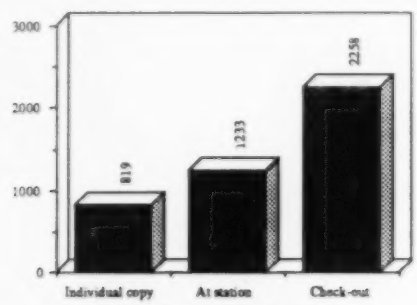


Taken School's Microcomputer Home

With 40.77 percent responding yes, secondary teachers are more likely to have taken a microcomputer home.

Availability of Productivity Software

5. What is the availability of productivity software for use in your building?
   a. Teachers are assigned individual copies.
   b. Copies are available to each work station or networked.
   c. Copies are available for checkout at a central location.

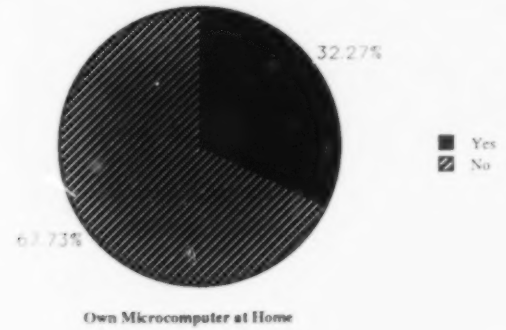


How to Obtain Productivity Software

Teachers could answer yes to more than one of the listed times. Most teachers obtain productivity software by checking it out from a central location.

Teacher Owns Microcomputer

6. Do you own a microcomputer at home?

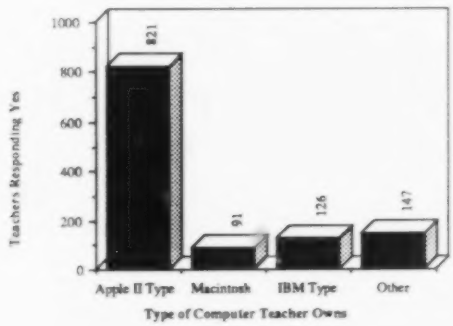


Own Microcomputer at Home

Only about one-third of teachers own a microcomputer at home. With 24.36 percent and 25.73 percent respectively answering yes, teachers with five years or less experience and teachers with 26 years or more experience are least likely to own a microcomputer.

Type of Microcomputer Teacher Owns

7. If you answered yes to question 6, what type of microcomputer do you own?



The most common computer type teachers own is an Apple II. This computer type is also the most common type used by teachers in their school building

Proficiency for using:

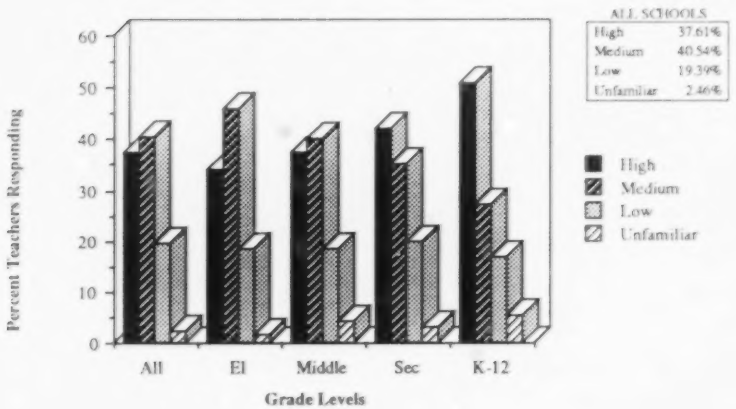
8. Rate your proficiency for using the following productivity tools.

   High - very proficient, use regularly
   Medium - some proficiency, could use some advanced training
   Low - little or no skill
   Unfamiliar - do not know what this item is

Teachers rated their proficiency for using productivity tools in the following nine areas:

Basic computer skills	Word processing
Graphics	Grade book software
Databases	Desktop publishing
Instructional management	Online communications
Authoring	

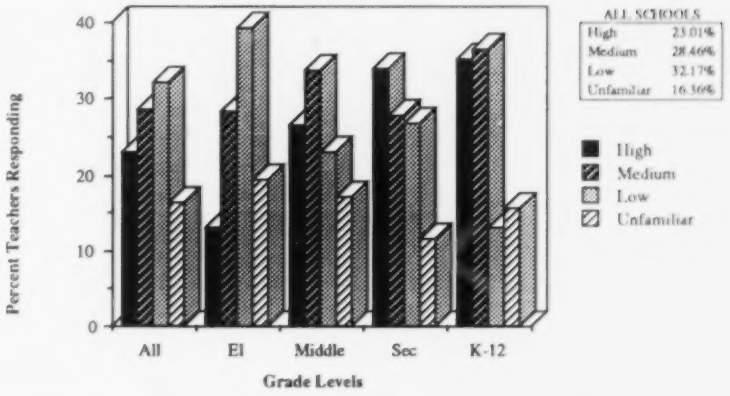
Beginning skills in using computers



The majority of teachers rate their beginning computer skills as high or medium. Teachers currently teaching grades K through 12 are more likely to rate their beginning computer skills as high.

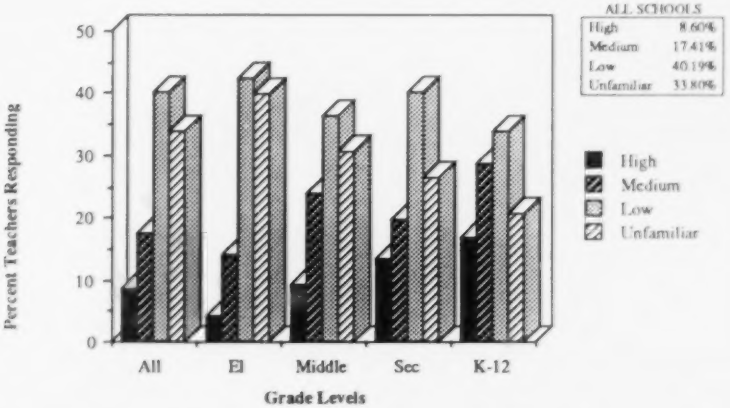
Proficiency for using:

Word processing



The majority of teachers rate their word processing skills as high or medium. At least one-third of secondary school teachers and teachers of grades K through 12 rate their word processing skills as high. A percentage of 39.31 elementary school teachers rate their word processing skills as low which is far more often than teachers of all other levels.

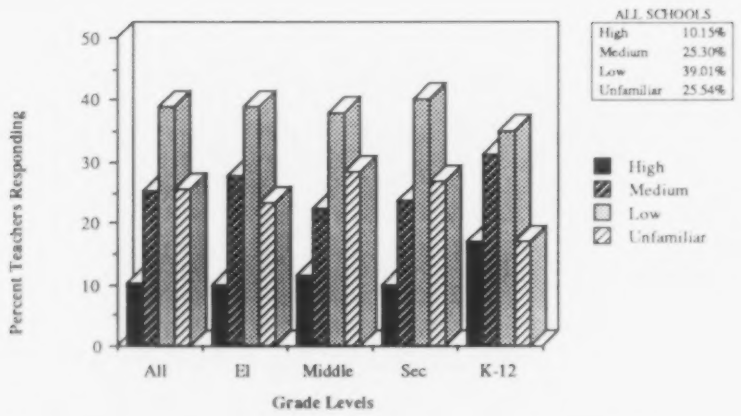
Databases



Databases show a dramatic reversal in teacher proficiency. The majority of teachers rate their database skills as low or unfamiliar. Teachers currently teaching grades K-12 report the greatest proficiency with 16.88 percent rating their skills high.

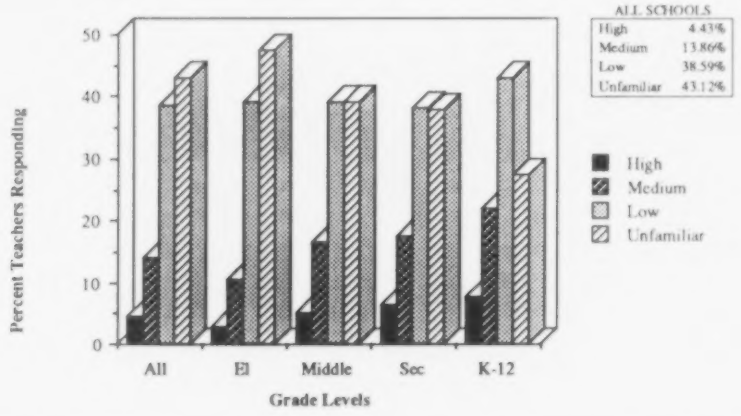
Proficiency for using:

Graphics



Graphics skills are only slightly higher than databases. Teachers seem to be more familiar with what graphics are. But they rate their proficiency in using them at about the same low level as databases.

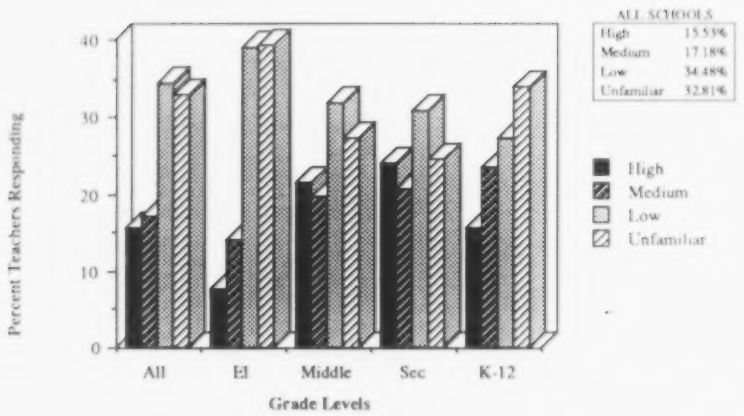
Desktop publishing



The percentage of teachers who are unfamiliar with desktop publishing is very high. Of those teachers who are familiar with desktop publishing most rate their skills as low.

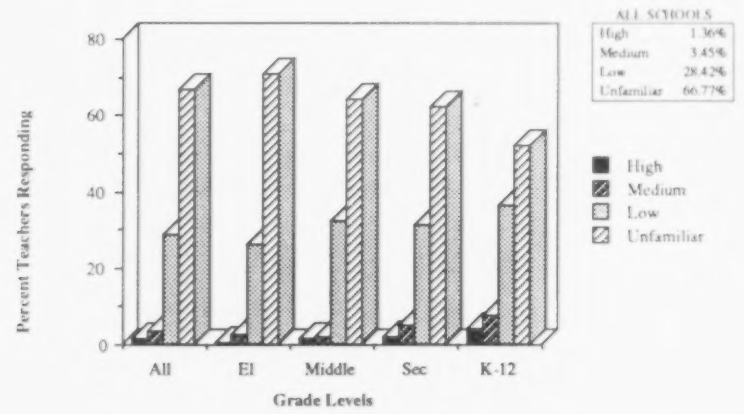
Proficiency for using:

Grade book software



Teachers seem to know somewhat more about using electronic gradebooks. The mode for middle and secondary teachers is "low." K-12 and and elementary most often rate it as "unfamiliar."

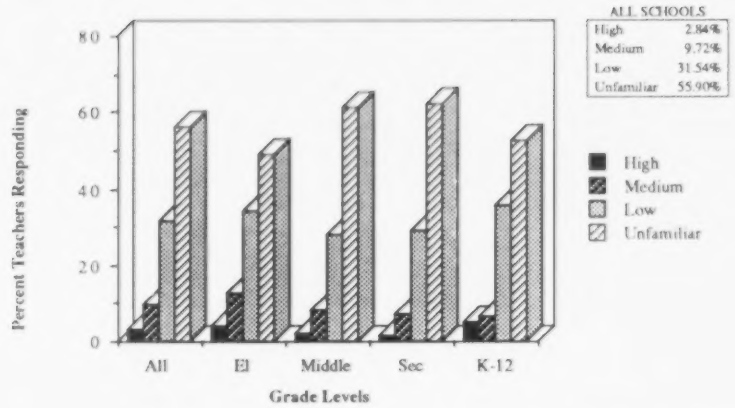
Online communications



The majority of teachers do not know what this application is. The mode for all groups is "unfamiliar." The higher the grade levels taught, the more likely a teacher is to indicate some level of proficiency.

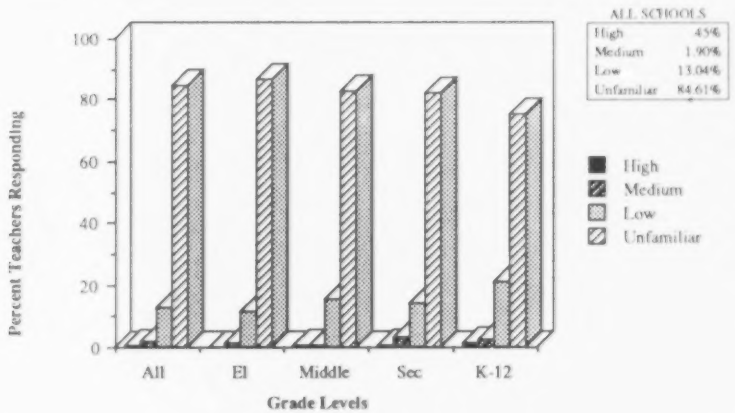
Proficiency for using:

Instructional management systems



The mode for all groups is "unfamiliar." "Low" is the next highest rating for all groups.

Authoring systems



Teachers seem to know the least about this computer application. Almost 85 percent of all teachers do not know what this application is.

Interest in Learning:

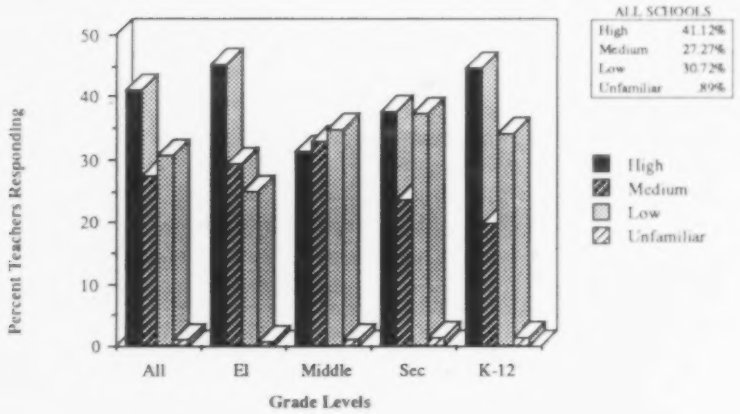
9. Rate your interest in learning how to use the following computer productivity tools:

   High - very interested, a good chance I would participate
   Medium - some interest, some chance I would participate
   Low - little or no interest at this time
   Unfamiliar - do not know what this item is

The survey presented teachers with the same list of productivity tools for a second time and asked about interest in learning to use them.

Word processing	Graphics
Grade book software	Basic computer skills
Databases	Desktop publishing
Instructional management	Online Communications
Authoring	

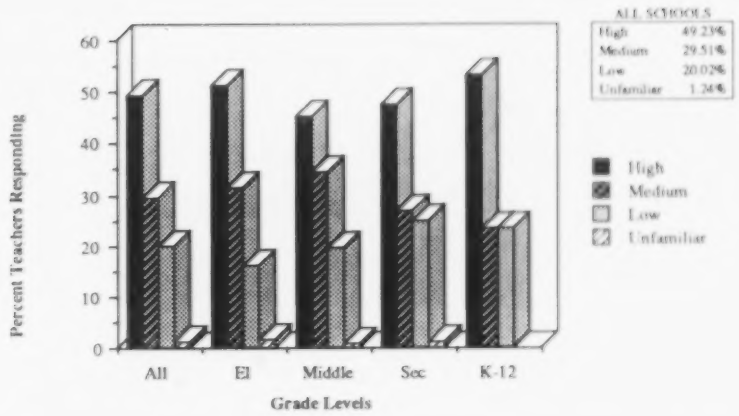
Beginning skills in using computers



The majority of teachers at all levels are interested in learning more about beginning computer skills. This response is somewhat surprising considering teachers answering the previous question indicated that it is the skill at which they are most proficient.

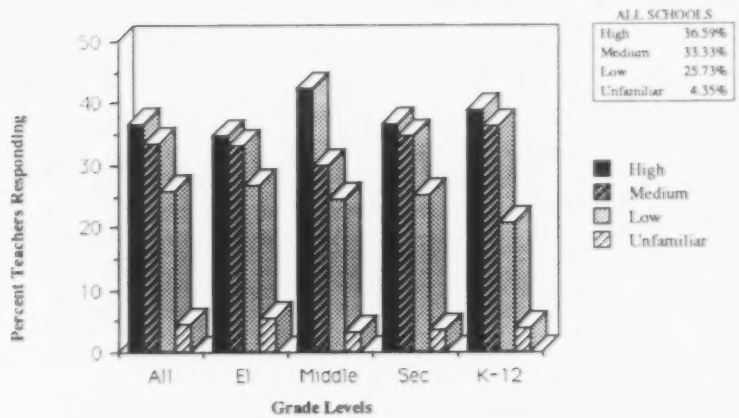
Interest in Learning:

Word processing



Word processing is the skill teachers indicated the most interest in learning. Fewer teachers marked "unfamiliar" than any other skill.

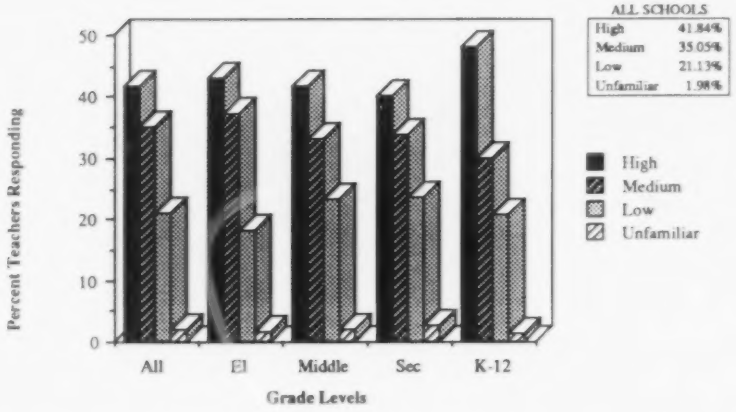
Databases



Interest in learning to use databases is only slightly less than ratings for graphics. "High" is the mode for teachers at all grade levels.

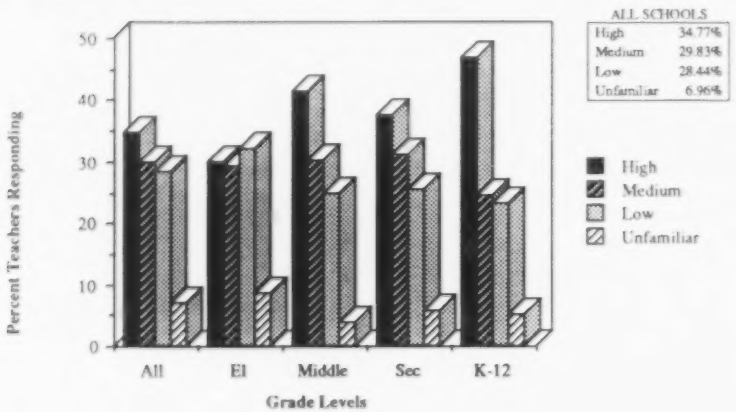
Interest in Learning:

Graphics



Interest in learning graphics is strong with three-fourths of teachers at all levels ranking it "high" or "medium." "High" is the mode for teachers at all grade levels.

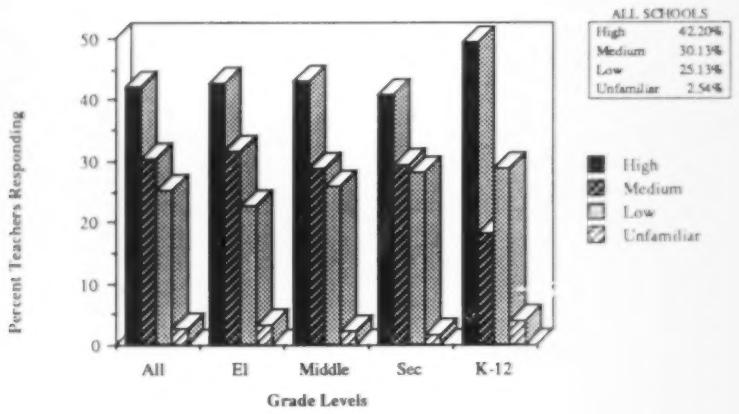
Desktop publishing



Interest in desktop publishing varies across the grade levels. "High" is the mode for all levels except elementary where "low" is slightly higher. With 46.75 percent rating it "high", K-12 teachers seem more interested in learning desktop publishing.

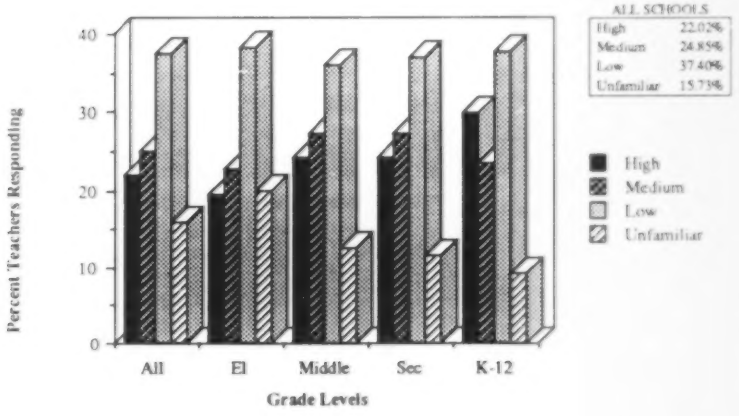
Interest in Learning:

Grade book software



"High" is the mode for all grade levels in learning grade book software. Only about one-fourth of teachers rank it "low".

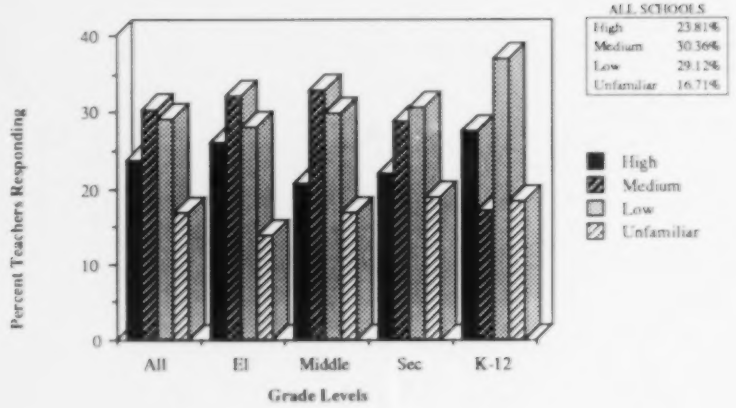
Online communications



Interest is quite low in learning online communications, as indicated by the mode being "low" for all groups. This reaction is not surprising considering most classrooms do not have an outside telephone line.

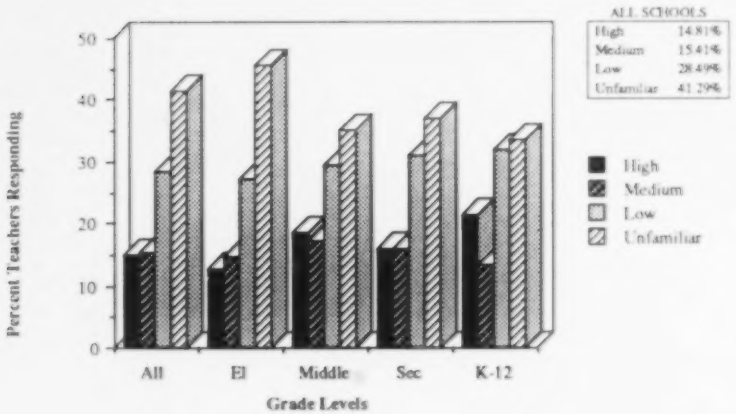
Interest in Learning:

Instructional management systems



Interest in learning more about instructional management systems is limited. The groups seem fairly evenly divided among "high," "medium," and "low." Secondary and K-12 teachers indicate "low" interest as their modes.

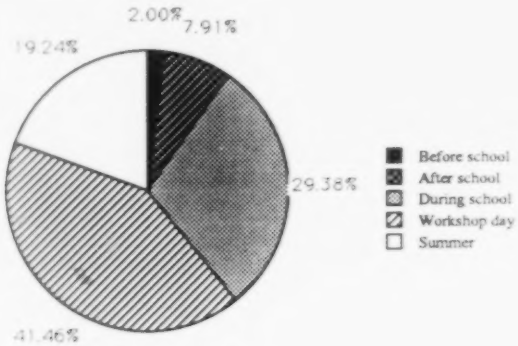
Authoring systems



Teachers really don't seem to know enough about authoring systems to indicate an interest. "Unfamiliar" is the mode for all levels. Interest in authoring skills is the lowest of all skills.

Preferred Time for Inservice

10. Indicate your most preferred time for inservice on productivity tools.

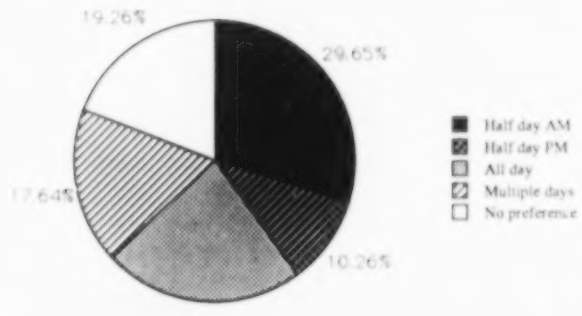


Preferred Time for Inservice

Most teachers prefer computer inservice during the regular workshop days. Before and after the school day is the least acceptable.

Preferred Length of Inservice Time

11. Indicate your most preferred length of time for inservice on productivity tools.



Preferred Length of Time for Inservice

Teachers are fairly evenly divided on the preferred length of time for inservice. The largest group favors half-day mornings.

Teacher Comments

A final open-ended question was asked, "*What is needed to increase your interest in using computer productivity tools?*" In reading the teacher comments, several themes become apparent. Making time available to learn and use computers is a major issue, along with getting access to more powerful computers. Time was mentioned in 635 teachers' comments. A typical comment is, "*To become familiar enough with their purposes so I can see a need for them in helping me with my teaching. I don't need more busy work. I need a tool that will make life easier not more complicated. These tools must be speedier and time savers, and available.*" Access to software does not seem to be a major issue except that many teachers are still asking what instructional applications are available in their subject area. Interest is high for inservice although teachers find it difficult to find time to participate. A significant number of teachers, 1936, responded to this question. They have been sorted into the following categories:

Time	362
Equipment (including computers, printers, etc.)	355
Inservice	297
Instructional applications	101
Computers and inservice	94
Computers and time	92
Inservice and time	70
Computers and software	65
Interested	40
Rationale or purpose	39
Software or better software	36
Time, computers, inservice	35
Computers, software, inservice	33
No interest	29
Computer at home	27
Time, computers, software	20

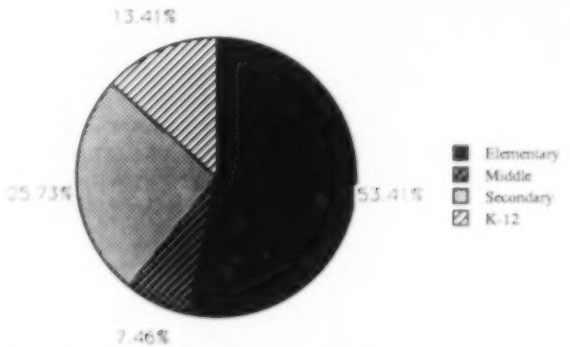
Software awareness	20
Support	20
Software and inservice	18
Time and software	17
Computer and support	17
Hands-on	17
Incentives	14
Time and support	13
Computer at home and at school	12
Student lab	12
Money	10
Time and computer at home	9
Time, computers, support	6
Computer, inservice, support	6
Time, inservice, support	5
Computers, software, inservice, support	5
Computer specialist	4
Inservice and support	4
Administrative support	3
Software, inservice, support	3
Keyboarding	3
Time, software, inservice	2
Computers, software, support	2
Time, computer, software, support	2
Time, computers, inservice, support	2
No typing	2
Miscellaneous	13

Computer Usage Building Survey

Statement of Sampling and Methodology

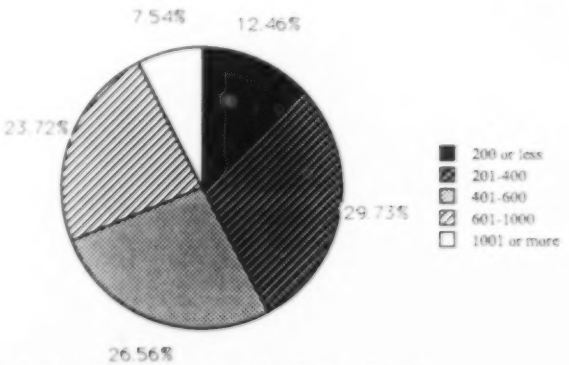
In September of 1988 a separate questionnaire was sent to the principal of all Minnesota public schools requesting the person responsible for computers in the building answer the questions. Out of 1506 schools surveyed, 962 or 64 percent were returned. The purpose of this survey was to determine teacher access to computers, software, training and support.

Distribution of Building Responses by Grade Levels



Distribution of Responses by School Levels

Distribution of Building Responses by School's Enrollment

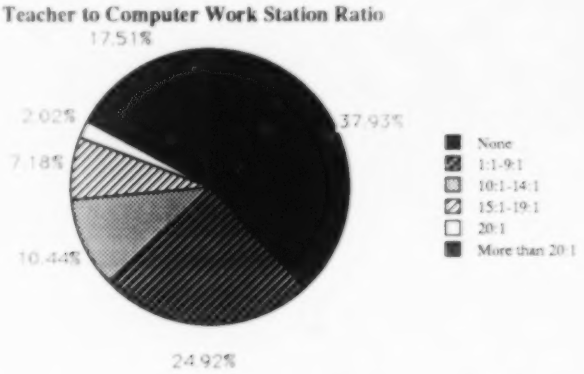


Distribution of Responses by School's Enrollment

Summary of Survey Responses

Teacher/Computer Ratios

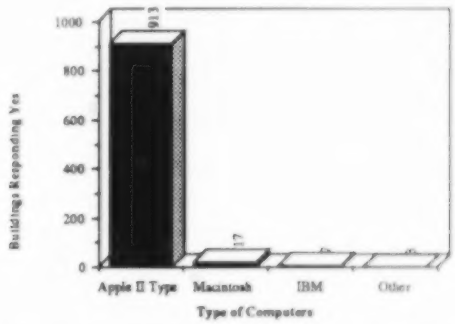
1. How many licensed teachers are assigned to your school?
2. How many computer work stations for teacher use only does your school have?



Questions one and two were asked to determine whether the school has computer work stations for teacher use only and to estimate the teacher-to-computer work stations ratio. The computer-to-teacher computer work station ratio has been computed for each responding building. Thirty-eight percent or 338 schools report having no computer work stations for their teachers. The highest teacher to computer ratio for a school building is 82:1.

Types of Teacher Computers

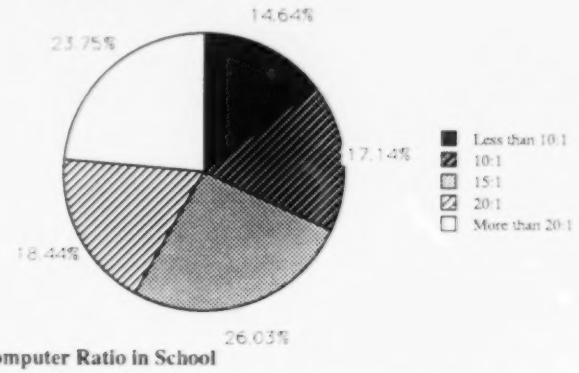
3. What type of computer is most often used by the teachers for their preparation work?



The most common computer type used by teachers for their preparation of work is Apple II. This computer type is also the type teachers own most often.

Student/Computer Ratios

4. Which of these most closely approximates the current student-to-computer ratio in your school?

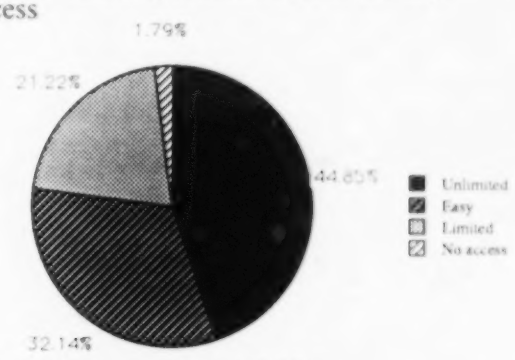


Student to Computer Ratio in School

The student to computer ratio shows a more even distribution of responses than the teacher to computer ratio. This contrast is not surprising considering the emphasis on student computer ratios and instructional computing.

Teacher Access to Building Microcomputers

5. Indicate the extent teachers have access to microcomputers within their building.
   a. Unlimited access. They can use a microcomputer any time, (days and evenings).
   b. Easy access. They can use a microcomputer any time during the school day.
   c. Limited access. They can use a microcomputer only on specified days and/or during specified hours of the day.
   d. No access

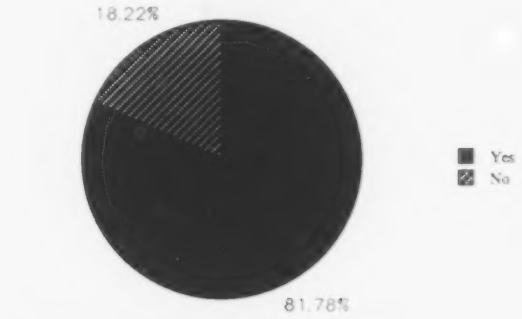


Teacher Microcomputer Access in Building

The majority of schools have some limits on teacher access to computers. This same question, worded slightly differently was asked of teachers. Teachers most often answered "I can use a microcomputer anytime during the school day," which would be similar to "easy" on this question.

Teachers Taking Computers Home

6. Are teachers allowed to check out microcomputers for use at home?

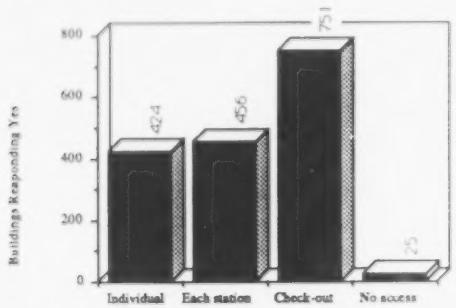


Teachers Allowed to Take Microcomputers Home

While 81.78 percent of schools permit teachers to take home computers, the teachers report on the other survey that only one-third of them have taken a computer home.

Availability of Productivity Software

7. What is the availability of productivity software for teachers in your building?
   a. Teachers are provided/assigned individual copies
   b. Copies are available at each teacher work station or networked
   c. Copies are available for checkout at a central location
   d. No access

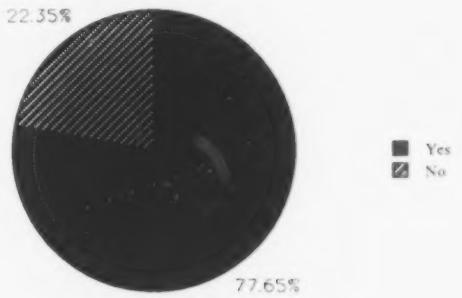


Where to Obtain Productivity Software

Schools could answer yes to more than one response. The most frequent method used by schools to provide productivity software to its teachers is by checking it out from a central location. Teacher survey results agree with this response.

District Provides Computer Training

8. Does your district provide training for teachers to use productivity software?

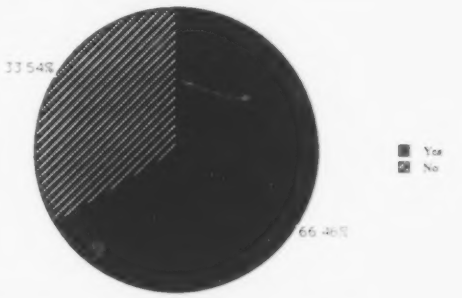


District Provides Teacher Computer Training

Most districts offer computer training to their teachers.

District Pays Expenses for Computer Training

9. Does your district pay the registration and/or expenses for teachers to receive training in using productivity software?

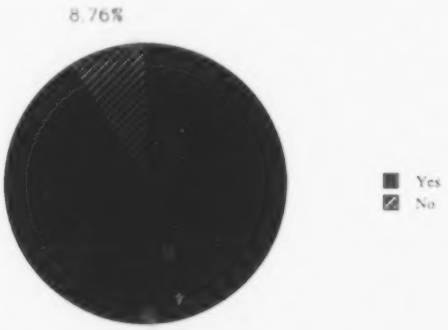


District Pays Registration and/or Expenses for Computer Training

The responses to questions eight and nine indicate that the vast majority of school districts are attempting to make computer training available to their teachers either within the district or at outside workshops.

Support Person Available

10. Is there a staff member within your building to assist teachers who have software application questions/problems?

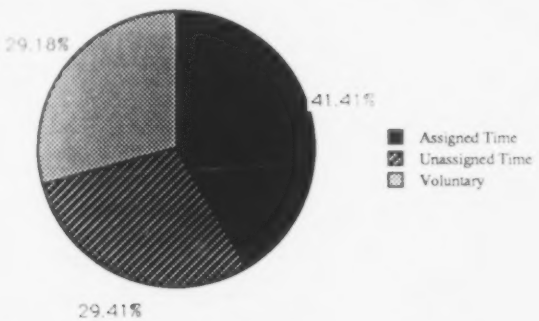


Building Staff member Who Assists with Computers

The affirmative response to this question is the highest rate for any in the building computer usage survey. It may reflect the fact that the state's regional technology coordinators have asked districts to identify a contact person.

Type of Assignment for Support Person

11. If answer to questions #10 is "yes" indicate the type of assignment given to this staff member.
    a. A paid assignment with assigned time?
    b. A paid assignment without assigned time?
    c. A voluntary position?



Type of Assignment for Computer Support Person

Schools that have a computer support person are most likely to make it a paid position with assigned time.

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